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SOME REMARKS ON THE HISTORY OF LEPROSY IN INDIA

It is not known where or when leprosy first made its appearance. It afflicts or has afflicted people of all races living in all climates. Although today it is prevalent only in warmer climates, it is known to have been endemic in the past in Siberia and Scandinavia. Indeed, it persisted in Scandinavia for centuries after it had largely disappeared from most of Western Europe. After reaching its peak in Western Europe in the twelfth and thirteenth centuries it declined rapidly thereafter for reasons about which there has been much speculation. Yet in Norway even in 1852 there were 1782 patients registered as suffering from leprosy and it is thought probable that the actual number of sufferers may have been nearer to twice that number, which would indicate an incidence of two per thousand.

Although standards of living and hygiene are known to be factors affecting the persistence of leprosy, it is not confined to slum dwellers. It is found even today among nomadic peoples, especially in Africa. Certainly the decline and disappearance of leprosy in Western Europe cannot be ascribed to improvements in the standards of living and hygiene. They can be held responsible only for the fact that leprosy has not been able to reestablish itself there subsequently. One important factor involved in the decline of leprosy in Western Europe was the spread of tuberculosis, which is now known to confer cross-immunity to leprosy and confers immunity even on persons who have been exposed to tuberculosis without contracting it.

The Norwegian doctor Gerhard Henrik Armauer Hansen (29 July 1841-12 February 1912) discovered in 1873 the bacillus Mycobacterium

leprae [1], which is responsible for leprosy. It closely resembles Mycobacterium tuberculosis. Hansen tried to infect himself with leprosy bacilli, and it is thought that the reason for his failure to contract leprosy was the fact that he had obtained immunity from his wife, who had died of pulmonary tuberculosis a few years previously. Hansen's father-in-law was convinced that leprosy is hereditary and agreed to be inoculated by Hansen with leprosy bacilli in order to prove his point. However, the fact that he too failed to contract leprosy is to be ascribed not as he thought to the hereditary character of leprosy but to an attack of pulmonary tuberculosis he had suffered at the age of seventeen.

Leprosy is virtually non-existent in Europe and Europeans tend not to be aware of the problem it poses in the world as a whole. In 1977 the World Health Organisation Expert Committee on Leprosy stated that the world incidence of leprosy « may well exceed 12 million ». Estimates are notoriously unreliable, but even the number of registered cases of leprosy is considerable: more than 3,500,000 according to *A guide to leprosy control*, published by WHO, Geneva, 1980, p. 7. The WHO guide is pessimistic in tone and states that there is « uncertainty at present whether, even after long periods of treatment, freedom from infection will ultimately be obtained ». However, there are some grounds for optimism. A new « leprosy eradication programme » that was developed at the research institute in Borstel by the Deutsche Aussätzigen-Hilfswerk was tried out in Malta beginning in July 1972. By the end of 1980 only one patient still required treatment. The experiment was entirely successful.

In 1955 the Indian Central Government formed a Committee for the Control of Leprosy [2]. On the recommendation of that Committee the National Leprosy Control Programme was launched. In 1955 the Committee estimated the number of leprosy cases in India to be about 1.5 million. In 1962 the estimate was raised to 2.5 million. In 1972 it was raised further to 3.2 million. No doubt in 1982 the estimate will again be raised substantially. However, the increases in the estimates are thought to reflect rather the increased activity of leprosy workers in detecting cases than an increase in the prevalence of leprosy itself.

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1. The date of Hansen's discovery of the leprosy bacillus is undoubtedly 1873 as stated by Jopling p. 10; Bryceson pp. 3, 118; G. Olpp, *Hervorragende Tropenärzte in Wort und Bild*, München, 1922, p. 171. The standard general reference works in German are unreliable on this point. *Meyers Lexikon*, ed. 8, 1938, has 1880; ed. 9, 1974, has 1870; *Der Grosse Brockhaus*, ed. 18, vol. 5, 1979, p. 181, has 1869. H. Müller-Bütow, *Lepra, ein medizinhistorischer Überblick unter besonderer Berücksichtigung der mittelalterlichen arabischen Medizin*, Frankfurt am Main/Bern, 1981, p. 13, gives the date of publication (1874) as the date of discovery. So too does B. Solomons, *Lecture notes on dermatology*, Oxford/Edinburgh, ed. 2, 1969, p. 121. The discrepancies have been definitively disposed of by Th. M. Vogelsang in his biography of Hansen in *IJL*, 46.3, 1978, 284-285.

2. For this paragraph see K. C. Das, *National Leprosy Control Programme*, in « Leprosy in India », 48.4, 1976, 808-812.

Nevertheless, it is clear that the problem raised by leprosy in India is substantial and that the Government is still far from having the problem under control.

In Europe most people are probably unaware of the existence of « World Leprosy Day » despite the efforts made by the various European organizations engaged in the fight against leprosy. World Leprosy Day was founded in 1954 by Raoul Follereau [3]. In general it is observed on the last Sunday of January, but in India it is known as « Anti-Leprosy Day » and is celebrated as a national holiday on January 30th to coincide with the so-called « martyrdom day of Mahatma Gandhi » [4]. It is a day of hard campaigning on the part of those involved in the fight against leprosy. Attention is drawn to various aspects of the leprosy problem on the radio. Special posters and leaflets for free distribution are printed. Slides are shown in the cinemas.

The activities in India directed towards dealing with the problem of leprosy are numerous and varied. When they began is not known. The disease itself was probably brought to India when the first Aryans entered the subcontinent from the north although the local Dravidian population was no doubt already afflicted by the disease. Leprosy is one of the oldest diseases known to have afflicted mankind and it is probable that it was endemic among the Indo-Europeans. The fact that there is no Indo-European word for leprosy does not prove that the disease was not present: it is merely a reflection of the fact that the Indo-Europeans had not developed a scientific doctrine of medicine.

There is not only no Indo-European word for leprosy, there is not even an Indo-Iranian word for it. The only certain case of an Indo-Iranian designation of a particular disease is in fact a word used for a skin disease, namely Avestan and Old Indian *pāman-*. However, there is no indication that it was ever applied to leprosy and indeed it was later used of mange as in Chorasmian *p'mn(k)* rendering Persian *gargīn* « mangy » and in Pashto *paman* « mangy ».

The classical Indian doctrine of medicine developed gradually from the Indo-Iranian philosophical speculation concerning man and the world. That there was no scientific doctrine of medicine in Indo-Iranian times or even in Vedic India has been ably demonstrated by J. Filliozat [5]. It is not until the time of the development of this classical Indian doctrine of medicine, the so-called Āyurveda, that we can be reasonably sure that leprosy is being discussed. Even when the same terms as are found in Āyurvedic literature are encountered in earlier works there is no guarantee that they already had the later meaning. Indeed, it is normal to expect that a developing science develops at the same time the terminology it requires.

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3. On Follereau see the obituary by S. G. Browne in *IJL*, 46.1, 1978, 68-69.
4. « Leprosy in India », 49.2, 1977, 313.
5. *The classical doctrine of Indian medicine*, tr. Dev Raj Chanana, Delhi, 1964.

The world of Atharvaveda, the magico-religious poems from which our knowledge of Vedic medicine is largely derived, is far removed from that of Āyurveda. AV 1.23, 24 provide charms to combat *kilāsa*, which in the tradition of the much later commentator Sāyaṇa (14th century) is usually held to be « white leprosy ». It is not clear whether *kilāsa* already denoted the same disease as in Āyurvedic medicine, but from the AV itself we cannot conclude anything more than that *kilāsa* was a disorder of the coloration of the skin characterized by whiteness. At this early date it seems unlikely that the different varieties of such disorders could have been distinguished. As Filliozat, *op. cit.* p. 126, rightly concluded: « The Vedic sorcerer limits himself to stating the superficial symptom ».

The latest treatment of these hymns is in the as yet unpublished thesis by Kenneth G. Zysk, *Early Vedic ideas of disease and healing, with translations and annotations of medical hymns from the Ṛgveda and the Atharvaveda*, ANU, 1981. Zysk suggests (p. 230) that *kilāsa* may refer to the condition known as leucoderma [6], in which pigment disappears from the skin in patches so that they become white. Inasmuch as it may be difficult to distinguish [7] between leucoderma and hyper-pigmentation, a distinction unlikely to have been made by Vedic physicians, even this attempt to define *kilāsa* in terms of modern medical terminology may be misleading. Moreover, as pointed out already by J. Jolly, *Medicin*, Strassburg, 1901, p. 98, it is difficult to distinguish cases of leucoderma from those of the hypo-pigmentation [8] that may accompany tuberculoid leprosy. It is because of the characteristic hypo-pigmented macules that tuberculoid leprosy is later known as *śveta-kuṣṭha*, the term used by Sāyaṇa to explain *kilāsa* in the AV hymns in question. It is just as rash to exclude the hypo-pigmentation of tuberculoid leprosy as to confine *kilāsa* to that condition. It is unjustifiable to attribute to *kilāsa* anything more than can be directly deduced from the hymns themselves and that is merely that it refers to a disorder of the coloration of the skin characterized by whiteness.

Even in classical medical literature no word exactly corresponding to the concept of leprosy in modern western medicine is found. The classical Sanskrit word *kuṣṭha* has been adopted for « leprosy » in Hindi and elsewhere, but it is clear from the ancient descriptions and classifications of *kuṣṭha* that it was used in Āyurvedic medicine to denote « skin disease » in general. Its use to denote leprosy is simply a case of specialization: leprosy was and is the skin disease par excellence.

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6. Hoernle, *Bower MS*, translates Āyurvedic *kilāsa* as « leucoderma » but he also renders *śvitra* and *sidhma* by « leucoderma ». His glossary (p. 367) makes it clear, however, that he uses « leucoderma » in the general meaning of « leucodermic diseases ».

7. Bryceson p. 16; Jopling pp. 35-6.

8. B. Solomons, *Lecture notes on dermatology*, ed. 2, Oxford/Edinburgh, 1969, p. 172.

To quote a modern textbook, Jopling's *Handbook of leprosy*, p. 18: « The most remarkable thing about leprosy is the enormously wide variation in the way the disease affects different persons ». It is accordingly difficult to describe and classify the kinds of leprosy, and there is even today no consensus concerning the classification of leprosy. Numerous recommendations have been made by national and international committees but with limited success. There is, however, general agreement about the existence of three main types of leprosy. These are known as lepromatous, tuberculoid, and borderline.

If it difficult to classify the kinds of leprosy it is even more difficult to classify the kinds of skin disease. The problem was recognised by the Āyurvedic physicians. Thus, Caraka wrote that *kuṣṭha* « may be classified into seven kinds or eighteen kinds or innumerable kinds » (Ni. 5.4) [9]. The classification into eighteen kinds appears to have become the standard doctrine by the time of our Āyurvedic texts [10]. The number eighteen is specifically stated also by Bhela, Ci. 6.11; Suśruta, Ni. 5.5; Ravigupta, 12.1[2]; Hārīta, p. 332[3]. Eighteen kinds of *kuṣṭha* are described by Bhela, Ci. 6; Caraka, Ci. 7; Suśruta, Ni. 5, and by Vāgbhaṭa, Ah., Ni. 14. The only aberration in an early text is in the Nāvanītaka 2.1.86, where mention is made of 36 *kuṣṭha* although they are not specified. However, even this tradition probably implies the eighteenfold classification found elsewhere [11].

The eighteenfold classification of *kuṣṭha* is based primarily on the appearance of the skin [12]. It is pointless to try to equate any of these items on this basis alone with a variety of leprosy since, to quote Jopling again (p. 18): « leprosy lesions cannot be diagnosed from their appearance alone and can be mimicked by a number of skin diseases ».

The development of the doctrine of the three humours, *vāta* « wind », *pitta* « bile », and *kapha* « phlegm » is a well-known feature of Āyurveda. In the course of time much ingenuity was devoted to classifying all diseases according to the extent to which the humours were held to be responsible for them. The humoral doctrine was superimposed upon earlier classifications that were based more directly on observation than on medical theory. Seven combinations are theoretically possible if diseases are attributed to each of the three humours separately, to any two of them combined, and to all three of them together. Caraka, Ni. 5.5 uses this analysis to characterize his group of seven *kuṣṭha* diseases, all but one of which are said to be curable (Ni. 5.8). Suśruta, Ni. 5.7 and Vāgbhaṭa, Ah., Ni. 14.7-10 extend the analysis to cover all eighteen

9. *Sa sapta-vidho 'ṣṭādaśa-vidho 'parisaṃkhyeya-vidho vā bhavati*

10. There is some variation in nomenclature that makes it difficult to reconcile in all details all the lists of eighteen found in the texts.

11. See HOERNLE, *Bower MS*, p. 88, n. 64.

12. Identifications based on the list given by Suśruta can be found in P. Ray's Synopsis pp. 321-25.

varieties of *kuṣṭha*. The extended analysis occurs also in Caraka, Ci. 7.27-30.

In Suśruta, Ni. 5.18 and Caraka, Ci. 7.35-36 symptoms are listed to aid in the determination of which humour may be involved. Some of these leave us in no doubt that leprosy must have been among the conditions being classified. According to Suśruta characteristics of wind are *kauṇya* « paralysis of the hands » (*naṣṭa-kara-tā* according to Aruṇadatta and Hemādri), *svaropaghāta* « hoarseness », etc.; characteristics of bile are *aṅguli-patana* « falling off of the fingers », *karṇa-nāsā-bhaṅga* « breaking in of the ear and nose », etc.

Another competing classification of *kuṣṭha* was based on a consideration of the body element affected. According to Caraka, Ni. 5 there were four susceptible (*dūṣya*) body elements: *tvak* « skin », *māṃsa* « flesh », *śoṇita* « blood », and *lasīkā* « serum » [13]. However, according to tradition there were altogether seven body elements [14]: *rasa* « nutrient fluid », *rakta* « blood », *māṃsa* « flesh », *medas* « fat », *asthi* « bone », *majjā* « marrow », and *śukra* « semen ». Suśruta, Ni. 5.22-27, followed by Vāgbhaṭa, Ah., Ni. 14.33-36, gives accordingly a sevenfold classification of *kuṣṭha* that accommodates both the four items listed by Caraka and the seven traditional body elements. The correspondence is somewhat forced. The commentators are divided as to whether *rasa* « nutrient fluid » is to be understood as included in the first item *tvak* « skin » or whether it is simply implied by an earlier general statement about the humours disturbing the body elements (Ni. 5.3 *dhātūn abhidūṣayan*). In any case *rasa* must be brought in somehow in order to accommodate Caraka's *lasīkā* « serum » since the impure matter of *rasa* was held to contain *lasīkā* [15].

Here again we find clear indications that leprosy was among the skin diseases being described. Thus, when the skin is affected the following symptoms are evident: *sparśa-hāni* « loss of the perception of touch », *svedanam īṣat* « slight perspiration », *vaivarṇya* « discoloration », *rūkṣa-bhāva* « roughness (of the skin) ». When the blood is affected we find *tvak-svāpa* « anaesthesia of the skin ». When the fat is involved there occurs *gātrāṇāṃ bhedanam* « breaking of the limbs ». In the case of bone and marrow the symptoms are *nāsā-bhaṅga* « breaking in of the nose », *kṣate krimi-sambhavaḥ* « the occurrence of worms in the ulcer », and *svaropaghāta* « hoarseness ». When the semen is affected we find *kauṇya* « lameness of the hand », *gati-kṣaya* « loss of the power of locomotion », *aṅgānāṃ sambheda* « distortion of the limbs », *kṣata-sarpaṇa* « spreading of ulcers ».

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13. These four are given in Ravigupta, Siddhasāra 12.1[2] and Kāśyapa p. 82.

14. References are given by Meulenbeld pp. 470-71. Add Ravigupta, Siddhasāra 1.12.

15. Vāgbhaṭa, *Aṣṭāṅgasaṃgraha*, Śā. 6.65-66; Meulenbeld p. 489.

The Sanskrit term *śvitra* is often translated [16] as « white leprosy » in contrast to *kuṣṭha* « black leprosy », the distinction being intended to represent the modern one between tuberculoid (white) leprosy and lepromatous (black) leprosy. However, such a contrast is not found in the classical medical literature. *Śvitra* is not one of the seven types of *kuṣṭha* listed by Caraka, Ni. 5 nor is it to be found among the eighteen types described by Caraka, Suśruta, and Vāgbhaṭa. Indeed the commentator Cakrapāṇidatta remarks [17] on the fact that in the case of the other (*kuṣṭha*) diseases Caraka first discusses the *nidāna* (aetiology) and then the *cikitsā* (therapeutics) whereas in the case of *śvitra* he proceeds in the reverse fashion.

In the Bhelasaṃhitā, Ci. 6.29 as in the Kāśyapasaṃhitā [18] and in Ravigupta's Siddhasāra 12.1[3] *śvitra* is in fact included in the list of eighteen *kuṣṭha* diseases. In all three cases [19] it is said to be incurable (*na sidhyanti* in Bhela and Ravigupta; *asādhyāni* in Kāśyapa). It is possible that *śvitra* in these authorities corresponds to *aruṇa* in Suśruta's list because Caraka says that *kilāsa* is known by the three names *dāruṇa*, *aruṇa*, and *śvitra* [20]. These three appear to correspond exactly to the respective types of *kilāsa* caused by bile (*sa-paridāha=dāruṇa*), wind (*aruṇa* in both cases), and phlegm (*śveta=śvitra*) according to Suśruta's description in Ni. 5.17.

Suśruta there draws a distinction between *kuṣṭha* and *kilāsa* to the effect that *kilāsa* affects only or perhaps especially the skin and is not characterized by secretion [21]. According to Filliozat, *op. cit.*, p. 124: « The precise indication given by this text concerning the difference existing between *kilāsa* and leprosy shows us clearly that one must not identify these two diseases ». However, *kuṣṭha* is not leprosy but skin disease in general as pointed out by Filliozat on the same page. It is true that the passage shows that *kuṣṭha* and *kilāsa* are not identical but it does not show that they are necessarily different diseases. After all it is expressly stated that *kilāsa* is « a variety of *kuṣṭha* » [22], and it or at least one type of it is listed among the eighteen *kuṣṭha*. The fact that the characteristics of these three kinds of *kilāsa* do not appear to limit them to leprosy is of no more significance than the fact that the other types of skin disease listed among the eighteen *kuṣṭha* do not point unmistakably to leprosy since they are primarily attempts to classify

16. So Hoernle, *Bower MS*, s.v.; Hilgenberg and Kirfel p. 273; J. Jolly, *Medicin*, Strassburg, 1901, p. 98 (« weisser Aussatz »).
17. Ad Caraka. Ci. 7.162.
18. Kāśyapa's list of 18 is identical with that of Bhela.
19. Bhela; Ci. 6.36; Savigupta, *Siddhasāra* 12.1[8]; Kāśyapa p. 82.
20. Caraka, Ci. 7.173:
dāruṇaṃ cāruṇaṃ śvitraṃ kilāsaṃ nāmabhis tribhiḥ
vijñeyaṃ trividhaṃ tac ca tridoṣaṃ prāyaśaś ca tat.
21. Ni. 5.17: *kuṣṭha-kilāsayor antaraṃ tvag-gatam eva kilāsam aparisrāvi ca.*
22. Ni. 5.17: *kilāsam api kuṣṭha-vikāra eva.*

affections of the skin according to its external appearance. It is only in combination with other factors such as the involvement of the body elements that symptoms clearly indicative of leprosy are described.

On the other hand, the symptoms mentioned are not incompatible with leprosy. In fact the symptoms characteristic of *kilāsa* due to wind may well be involved in a case of lepromatous leprosy while those characteristic of *kilāsa* due to phlegm may point to tuberculoid leprosy. Filliozat regards *kilāsa* due to wind as psoriasis, but I see no reason to exclude lepromatous leprosy. *Maṇḍala* may refer to annular lesions, *aruṇa* to erythematous macules, *paruṣa* to roughness of the skin, and *paridhvaṃsi* to ichthyosis, known to be a not uncommon late development in lepromatous leprosy affecting both treated and untreated patients [23]. Similarly, the symptoms of *kilāsa* due to phlegm are not incompatible with tuberculoid leprosy. *Śveta* may refer to hypopigmented macules, *snigdha* to glossiness of the skin, *bahala* to thickening of the nerves, and *kaṇḍūmat* to the neural symptom of tingling. Here admittedly the shininess of the skin points rather to borderline or even lepromatous leprosy (cf. Jopling, p. 38) and annular lesions are also indicative of borderline leprosy rather than lepromatous (cf. Jopling, p. 39), but there is no evidence that a separate category of borderline leprosy was ever defined in ancient times.

Another class of diseases discussed in Āyurvedic literature is that known as « wind-blood » (Sanskrit *vāta-rakta*, *vāta-śoṇita*, or *vātāsṛk*). In Suśruta, Ni. 1 *vāta-rakta* is one of four kinds of diseases of wind involving vitiation of the blood [24]. Caraka, Ci. 29.24 and later authors (e.g. Ravigupta, Siddhasāra 21.21-24) envisage further varieties.

Jolly mentions that Dutt considered *vāta-rakta* to include leprosy but he himself concludes that the symptoms adduced cannot refer exclusively to leprosy but evidently include gout and rheumatism (Medicin, pp. 98-9). Hoernle regularly translated *vāta-rakta* and its synonyms in the Bower MS as « leprosy », and R. Chaussinand, *La lèpre*, ed. 2, Paris, 1955, p. 12, following Dharmendra [25], considered the symptoms of *vāta-rakta* to correspond to the neural symptoms of leprosy.

Others have translated *vāta-rakta* as « rheumatism » e.g. Hilgenberg and Kirfel p. 280 and Vogel p. 78 or « gout » e.g. Bhāva, ed. Pandit Sri Brahma Sankara Miśra ad Ci. 29 p. 296 n.; P. Ray et al., *Suśruta Saṃhitā (a scientific synopsis)*, New Delhi, 1980, p. 399. Tibetan translations regularly have *dreg*, which Jäschke translates « gout » and, probably following Jäschke, Semičov renders as *podágra*. Vogel and I translate Tibetan *dreg* as « rheumatism », which has the advantage of being unspecific. P. V. Sharma in his new translation of Caraka leaves *vāta-rakta* untranslated. That is probably the safest policy as it is apparent that the concept

23. Jopling p. 21.
24. For their classification see P. Ray's Synopsis pp. 399-400.
25. DHARMENDRA, *Leprosy in ancient Indian medicine*, in *IJL*, 15, 1947, 424-430.

of *vāta-rakta* does not correspond exactly to any modern nosological entity.

Suśruta, Ci. 5.3 himself points out that *vāta-rakta* first appears on the skin like *kuṣṭha* and then invades the deeper parts, but he rejects the classification of *vāta-rakta* into the two kinds: *uttāna* « superficial » and *avagāḍha* « deep-seated ». This twofold classification is found in Caraka, Ci. 29.19.

According to Vāgbhaṭa, Ah., Ni. 16.5 the prodromes or premonitory symptoms are the same for *vāta-rakta* as for *kuṣṭha*. In fact, if one compares the prodromes of *kuṣṭha* given by Suśruta, Ni. 5.4 with the prodromes of *vāta-rakta* given by Suśruta, Ni. 1.47-48 and Ci. 5.4 only the following are found to be common to both: roughness of the skin, itching, excessively much or little sweat, and anaesthesia. These symptoms may but do not necessarily point to leprosy.

The descriptions of the different varieties of *vāta-rakta* given by Caraka, Ci. 29.25-29, Vāgbhaṭa, Ah., Ni. 16.12-16, and Ravigupta, Siddhasāra 21.21-24 do not provide any unmistakable indication that would prove that leprosy must be involved.

Many of the remedies prescribed for treating *kuṣṭha* patients are likely to have been handed down from the earlier magico-religious period of Indian medical history and retained in the tradition on the basis of the principle that one should not discard inherited knowledge but add to it. One such remedy is that for all kinds of *śvitra* recorded by Suśruta, Ci. 9.17:

kṛṣṇasya sarpasya masī sudagdhā
vaibhītakaṃ tailam atha dvitīyam
etat samastaṃ mṛditaṃ pralepāc
chvitrāṇi sarvāṇy apahanti śīghram,

a plaster made from the well-burnt ashes of a black snake and the oil of belleric myrobalan. Here the magical use of something black to remove something unnaturally white reminds us of earlier times.

In Ci. 9 and 13 Suśruta mentions the use of *tuvaraka* oil in the treatment of *kuṣṭha*. In chapter 13 detailed information is given concerning the preparation of the oil and its administration. Suśruta, Ci. 13.20-33 was incorporated by Vāgbhaṭa, Ah., Utt. 39.84-95 among other elixirs. In general, however, *tuvaraka* is not mentioned in early sources. It does not occur in Bhela, Caraka, the Bower MS, or Ravigupta. Moreover, it is striking that it is not mentioned by Suśruta in Ci. 10, where he gives many prescriptions specifically for treating the major *kuṣṭha* diseases (*mahā-kuṣṭha*). Where it does occur (Ci. 13), it is added at the end of a chapter giving remedies for diabetes (*madhu-meha*). Thus, the *tuvaraka-kalpa* does not have the appearance of having been originally regarded as a prescription especially for *kuṣṭha*, and in fact in the section of the Sū. where the properties of oils are described it

is mentioned along with oil from the marking nut tree (*bhallātaka*) as beneficial for urinary disease (*meha*) as well as for *kuṣṭha* (Sū 45.122). Moreover, the fact that *tuvaraka* is scarcely found in prescriptions for *kuṣṭha* even in later works shows that it cannot have been regarded as having had exceptional therapeutic value in the treatment of *kuṣṭha*.

According to the PW *tuvaraka* is just « N. eines Baumes, der in den Ländern am westlichen Meere wächst » and the PW refers to Suśruta. It is not listed in Dutt's *Materia medica*, Calcutta, 1922, and Hilgenberg and Kirfel could not give anything more precise than « Name eines bestimmten Baumes ». The most recent scientific synopsis of the Suśruta-saṃhitā by P. Ray et al. identifies *tuvaraka* as the cadjan pea, Cajanus indicus Spreng. Ind. or. This seems to be a simple error as Suśruta clearly describes *tuvaraka* as a tree (*vṛkṣa*). The authors have evidently confused *tuvaraka* with *tuvarī*, *tuvarikā*, which is a kind of pulse usually known as *āḍhakī* (e.g. Suśruta, Sū. 46.31). They may have been misled by PW, which is followed by MW, since the PW gives *tuvaraka* as a kind of *kudhānya* in Suśruta as its first meaning. The edition of Suśruta referred to by PW is that edited by Śrī Madhusūdana Gupta, vol. 1, Calcutta, 1835. It has *śāntanu-tuvarakoddālaka-* on the last line of p. 196. However, more recent editions of Suśruta read here *śāntanu-varakoddālaka-* in accordance with the commentator Ḍalhaṇa, who comments on *varaka*.

Recent Indian writers [26] identify *tuvaraka* as belonging to the family Flacourtiaceae. The earliest writer to have done so appears to be the Kaviraja Biraja Charan Gupta Kavibhusana in *The Vanauṣadhidarpaṇa or The Āyurvedic Materia Medica*, vol. 1, Calcutta, 1908, pp. 378-82: Gynocardia odorata, Hydnocarpus odoratus [27]. Among later writers note K. C. Chunekar and G. S. Pandey, *Bhāvaprakāśa-nighaṇṭu*, ed. 4, Varanasi, 1969, p. 826: Hydnocarpus wightiana Blume (=H. laurifolia [Dennst.] Sleumer); Priyavrata Śarmā, *Dravyaguṇa-vijñāna*, parts II-III, Varanasi, 1969, p. 167: Hydnocarpus laurifolia (Dennst.) Sleumer; K. R. Kirtikar and B. D. Basu, *Indian medicinal plants*, ed. 2, Allahabad, 1935 (repr. 1980), vol. 1, pp. 223-24: Gynocardia odorata R.Br.

According to Kirtikar and Basu, *op. cit.*, pp. 223-27 and R. N. Chopra, S. L. Nayar, and I. C. Chopra, *Glossary of Indian medicinal plants*, New Delhi, 1956, pp. 129, 137, the oil from the seeds of Gynocardia odorata R.Br. and of several species of Hydnocarpus, all belonging to the family of Flacourtiaceae, are used in the treatment of leprosy. However, the identification of *tuvaraka* as Gynocardia odorata R.Br. is due to a common confusion about the source of chaulmoogra oil. The matter was clarified by H. I. Cole in an important article on the « Chemistry of leprosy drugs » published in *IJL*, 1.2, 1933, 159-194, especially pp. 169-70.

26. « Most of the modern writers on Hindu medicine », according to DHARMENDRA, in *IJL*, 15, 1947, 427.

27. Information kindly supplied by G. J. Meulenbeld (letter 9.5.1982).

He pointed out that Gynocardia odorata contains neither chaulmoogric nor hydnocarpic acids and that the chaulmoogra oil that was often thought to derive from Gynocardia odorata was obtained from bazaars and actually originated from Hydnocarpus kurzii (King) Warb. (=Taraktogenos kurzii King) growing in Burma. In the course of time Hydnocarpus anthelmintica Pierre and H. laurifolia (Dennst.) Sleumer largely replaced H. kurzii as the sources of the oil used for treating leprosy and the term chaulmoogra has generally been used for any oil containing chaulmoogric acid.

Hydnocarpus laurifolia (Dennst.) Sleumer suits well the information provided by Suśruta and his commentator Ḍalhaṇa. It is a tree reaching some twelve to fifteen metres in height. It is endemic in tropical forests along the Western Ghats and grows especially near water. Both the seeds and the oil obtained from them have long been used to treat leprosy on the western coast. A British surgeon of the Indian medical service, F. J. Mouat, appears to have been the first person to draw the attention of western medical practitioners to the beneficial effects obtained by « native practitioners », that is, Āyurvedic physicians, from administering chaulmoogra oil to leprosy patients. His « Notes on native remedies no. 1 The chaulmoogra » first appeared in *Indian Annals of Medical Science*, 1, 1854, 646-662 and was reprinted in *IJL*, 3, 1935, 219-222.

Suśruta, Ci. 13, describes the external and internal administration of *tuvaraka* oil. According to him treatment with *tuvaraka* oil for five successive days in the prescribed manner provides a cure for all kinds of *kuṣṭha* disease. Even assuming that *tuvaraka* oil was in fact chaulmoogra oil, it is apparent that Suśruta's claim was highly exaggerated. However, it is equally clear that the use of chaulmoogra oil did provide some relief, and it went on being used as the main treatment for leprosy.

The oral administration of chaulmoogra oil is attended with a serious difficulty because it has a strongly nauseating effect. It is hardly surprising therefore that it should have occurred to people trying to ensure that leprosy patients consumed as much chaulmoogra oil as possible [28] that greater benefit might be obtained by injecting the oil.

It is not clear who first injected chaulmoogra oil and it is likely that many people thought of the idea independently. In a recent article in *Leprosy in India*, 52.4, 1980, 573-581, S. N. Chatterjee attributes (p. 574) the introduction of this method to Sir Leonard Rogers and his sister. He refers to an article by Rogers in *The Statesman* in 1918. Rogers had indeed published two articles on the subject in 1916: « Preliminary note on the use of gynocardates orally and subcutaneously in leprosy », *Lancet*, 1, 1916, 288-290 and « A preliminary note on the intravenous

28. On the importance of administering large doses of chaulmoogra oil see S. SCHUJMAN, *Therapeutic value of chaulmoogra in the treatment of leprosy*, in *IJL*, 15, 1947, 135-143.

injection of gynocardate of soda in leprosy » in the *British Medical Journal*, 2, 1916, 550-552.

However, Rogers was certainly not the first to have injected chaulmoogra oil. V. G. Heiser published in *Public Health Reports*, Washington, vol. 29, no. 42, 1914, 2763-2767 an account of the hypodermic use of a chaulmoogra oil mixture introduced by Dr. Mercado, House Physician at the San Lazaro Leper Hospital, Manila.

After about 1920 chaulmoogra oil was widely used with much success in the treatment of leprosy until the dapsone era arrived with the introduction of DDS (diaminodiphenyl sulphone) in 1947 [29].

Suśruta, Sū. 46.262, mentions *maṇḍūka-parṇī* in a list of potherbs used in the treatment of a variety of diseases including *kuṣṭha*. Caraka, Sū. 4.18 (5), lists *maṇḍūka-parṇī* as one of ten rejuvenating (*vayaḥ-sthāpana*) drugs. *Maṇḍūka-parṇī* is not mentioned by Caraka, Ci. 7, or Suśruta, Ci. 10, in the chapters giving prescriptions for the major *kuṣṭha* diseases. Suśruta, Ci. 28.4, gives a prescription based on *maṇḍūka-parṇī* as an elixir. Its use as an elixir is attested in Caraka, Ci. 1.3.30-31, repeated in Vāgbhaṭa, Ah., Utt. 39.44-45 and later. Caraka's formulation is found already in the Bower MS (Hoernle, p. 146 n. 338). However, the specific connection between *maṇḍūka-parṇī* and leprosy cannot be traced back to the classical Āyurvedic texts even though it is clear that *maṇḍūka-parṇī* was used for its therapeutic properties from very early times. It is not found in Bhela, Ravigupta's Siddhasāra or the Yogaśataka.

Maṇḍūka-parṇī has been generally identified as Indian pennywort, Centella asiatica (Linn.) Urban (=Hydrocotyle asiatica Linn.): Dutt, p. 176; Caraka Synopsis, p. 66 (no. 188); Suśruta Synopsis, p. 187; *Glossary of Indian medicinal plants*, p. 58; Kirtikar and Basu ii. 1195; Priyavrata Śarmā, *Dravyaguṇavijñāna*, parts II-III, Varanasi, 1969, p. 3; VŚS, p. 767 s.v.; Bower MS, pp. 16, 146.

Maṇḍūka-parṇī « frog-leaved » is a slender herbaceous creeping plant that grows all over India in marshy places up to 6000 feet. Either the entire plant or the leaves alone can be used for medicinal purposes. Centella asiatica contains a glycoside known as asiaticoside that has been found active in the treatment of leprosy. S. Chaudhuri and others published in the *Journal of the Indian Medical Association*, 70, 1978 a preliminary report on the « Use of a common Indian herb "Mandukaparni" in the treatment of leprosy » (reprinted in *Leprosy in India*, 51.1, 1979, 106-111). They used the whole plant including root, stem, flower, and fruits. The plants were washed several times in running water and then crushed into a paste. Pills weighing about 0.5 g. were prepared and dried in the sun. These pills were administered for one year to a small group of lepromatous patients and the results were com-

29. R. G. Cochrane and T. F. Davey, *Leprosy in Theory and Practice*, ed. 2, Bristol, 1964, p. 346; Jopling p. 80.

pared with those obtained by administering dapsone to a comparable control group. *Maṇḍūka-parṇī* appeared to be equally effective and none of the patients suffered from reaction whereas the dapsone treatment had to be interrupted in three cases due to reaction.

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